

Summary

Summary of Symposium D on “Magnetoelectronics”

Symposium D on “Magnetoelectronics”, held in Warsaw (Poland) during the E-MRS Fall Meeting in September 2005, was a multidisciplinary meeting addressed to scientists who are interested in the development of spin electronics from electrical engineering, material sciences, solid state chemistry and physics, both theoretical and experimental.

In view of the ongoing research on new materials for application in magnetoelectronics, Symposium D brought together scientists who are active in this modern and exciting field of science. It provided an opportunity to present recent developments and outline future research areas in the electronic and magnetic properties of a vast class of materials and nanomagnetic systems such as thin films, multilayers, intermetallic compounds, granular composites, fine-particle and molecular systems (including carbon and other nanotubes) and quantum dots.

Theoretical and experimental works presented at Symposium D were focused on the magnetic and transport phenomena in magnetic nanoscale structures and heterostructures. There was key-note lecture on spin transport in semiconductors (by myself) and six invited talks given by V.K. Dugaev from Ukraine, C. Felser and A. Hütten from Germany, R. Ferreira from Portugal, A. Mycielski and J. Barnaś from Poland. A plenary lecture on the concepts and challenges of spintronics was given by J. Fabian from Germany.

The key-note lecture was on spin transport in a semiconductor channel between spin-polarized source and a spin-polarized drain, a structure which is at the basis of several concepts of spin transistor. The operation of this type of device requires a spin polarized current to be injected into the semiconductor and the resulting spin accumulation to be transformed into an optimum output electrical signal, which leads to specific conditions on the interface resistances. The subjects of invited talks were magnetic switching by spin transfer torque, anomalous Hall effect in magnetic nanostructures, magnetic and electronic properties of Co_2XY alloys. Other invited speakers reviewed recent advances in magnetoelectronic devices, including read heads, non-volatile

memories, sensors and spin-injection devices with half-metallic Heusler alloys. Some aspects of the applications of II–VI magnetic semiconductors were a subject of the last invited talk.

There were also 15 oral contributions and 31 posters (only five posters were missing). This year for the first time the best poster presentations by PhD students was awarded at E-MRS Fall Meeting. One of the winners was chosen from Symposium D for a paper entitled “Magnetoresistance and magnetization processes in the helimagnetic compound DyMn_6Ge_6 and in related alloys”. The presenting author was Z. Śniadecki from Poznań (Poland) and two other young co-authors of this work were N. Kozlova and P. Kersch from Dresden (Germany). Their work was on prototypical rare-earth transition metal compounds with complex magnetic couplings. In these compounds, rare-earth and transition metal ions order simultaneously in a ferrimagnetic helix with locally antiparallel orientation of the sublattices. This layered magnetic system is an experimental model for studies on the relation between magnetization processes and magnetoresistance in complex metallic alloys. Field and temperature-dependent spin-reorientations give rise to anomalies in the electrical resistivity and sizeable magnetoresistance effects.

The organizers of Symposium D: B. Idzikowski from Poznań (Poland), U.K. Röbber from Dresden (Germany), M. Goiran from Toulouse (France) and W.D. Dobrowolski from Warsaw (Poland), myself included, thank all the colleagues and students who brought their most recent results and shared their best ideas with the audience in very animated discussions.

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